



QUANTIFICATION OF GROSS MOTOR DEVELOPMENT DELAY AT TERTIARY CARE CENTER -AN OBSERVATIONAL STUDY

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ABSTRACT

Background & Introduction: Physical therapists are important members of the professional team working with developmentally delayed children. Various tools are used to evaluate the motor development by physical therapist. The PDMS-2 is being studied in Normal children in India, not used in quantification of motor delay hence the study was taken to see whether PDMS-2 can quantify the gross motor developmental delay.

Materials & Methodology: PDMS-2 was used for assessment of 96 children, between ages of 12 to 60 months referred to pediatric physiotherapy after subjective evaluation. All the material was used as per PDMS-2 manuals, and test was administered as per the Guide to Item Administration.

Results & Conclusion: The result showed that standard score & gross motor quotient was statistically significant lower than normal score. (P = 0.0001). PDMS-2 can quantify the delay. This can be used with children having developmental delay to categories as per the manual & also helps in sub-test categories as in which area child is delayed.

KEYWORDS PDMS-2, Developmental delay, Gross motor,

Introduction

Peabody Developmental Motor Scale – 2 (PDMS-2) has been widely studied for its cultural variable, and questioned regarding its reporting. The studies have been conducted in India in regions like, Mangalore and Dharwad (urban and rural) which reported the same^{1,2,3,4}. It is very important for physical therapists to document regarding delay if it is present and also quantification. On a routine basis, therapists get the cases for therapy mentioning only delay but not the quantification in specific area. Here we undertook the study to see whether the scale assess motor developmental delay in specific sub category on patients who are referred for therapy having gross motor developmental delay. As reference to pediatric physical therapist are mostly for improving locomotion, sitting control, standing control which are components of gross motor function. PDMS-2 assesses both gross and fine motor component in depth from age group of 0 to 60 month^{5,6}. It has also shown to have good Reliability and Validity⁷. Gross motor component of PDMS-2 was considered for study. Objective of the study was to quantify the gross motor developmental delay by using PDMS-2. As studies on gross motor quantification lacks on PDMS-2, also the regional culture variation are common in assessment scales to understand the gross motor developmental delay in this area and standardizing the assessment scale for further use at tertiary care hospital. As in India early intervention services law lacks due to which many are deprived of services having scale which gives quantification is important^{8,9}

MATERIAL AND METHODOLOGY

The children who were diagnosed as Cerebral Palsy, Down syndrome, Gross motor developmental delay, by the pediatrician and referred for evaluation and treatment: Children of either gender from 1 year to 5 years of age. Children having gross motor developmental delay were included after fulfilling inclusion and exclusion criteria. Parent's written consent was taken. As per the examiner manual, manual states that modifications, special adaptations can be noted on the examiner record booklet. It also advises regarding clinical judgment and scoring criteria as to be adhered as close as possible. Scoring criteria 2 = the child

performed the item according to the criteria specified for mastery, 1 = the child performance showed a clear resemblance to the item mastery criteria but did not fully meet the criteria, 0 = the child could not or would not be able to attempt the item or the attempt did not show that the skill is emerging. None of the children included in our study were reported to be using any assistive devices during evaluation. Hence we adhered to scoring criteria of manual as given. the basal and ceiling level were considered for scoring^{10,5}

Sample size was calculated by-A pilot study which was conducted on 10 children referred by pediatrician for motor developmental delay. Standard scores were calculated for gross motor development. Based on standard score, the standard deviation of standard score was calculated and the sample size was calculated. Total sample size was 96

Materials: Peabody developmental motor scale, second edition (PDMS-2) was used with all items contained in it as per the instructions in manual¹¹

Result : The test were used in our study are, ANOVA, T-test Statistical Analysis was done using the SPSS version 21.0.

Table 1: Distribution of Male, Females and Diagnosis by Chronological Age Group

CHRO age Group	M	F	Diag 1	%	Diag 2	%	Diag 3	%	Diag 4	%	Total
12-23months	38	3	33	80.49	8	19.51	0	0.00	0	0.00	41
24-35months	21	10	19	61.29	5	16.13	4	9.68	3	9.68	31
36-47months	20	2	19	86.36	1	4.55	2	0.00	0	0.00	22
48-59months	2	0	0	0.00	2	100.00	0	0.00	0	0.00	2
TOTAL			71	73.96	16	16.67	6	3.13	3	3.13	96

Diagnosis 1-Motor developmental delay (71) - 73.96%,
 Diagnosis 2-Developmental delay with visual problem (16)-
 16.67%
 Diagnosis 3- Cerebral palsy (6) - 6.25%
 Diagnosis 4- Genetic disorder (3) - 3.13

Table 2 : Comparison of chronological age groups with age equivalence by one way ANOVA

CHRO Age Group	Stationary	Locomotion	Object manipulation
	Mean and SD	Mean and SD	Mean and SD
12-23months	5.71 +3.05	6.71+3.24	6.95+6.05
24-35months	17.16+12.67	15.35+7.28	15.55+4.99
36-47months	16.45+12.17	13.00+5.44	13.27+8.74
48-59 months	43.00+0.00	35.00+0.00	44.00+0.00
Total	12.65+1.73	11.53+7.39	11.95+8.79
F-value	17.6243	29.7670	28.2787
P-value	0.00001*	0.00001*	0.00001*

Age equivalent of stationary, Locomotion and object manipulation in month

TABLE 3: comparison of study standard score by standard scores in each of chronological age group

Age group	Variables	Study standard score	Standard score (as per manual)	P-value
12-23 months		Mean and SD	Mean and SD	
	Stationary	3.20+2.20	10.00+3.00	0.0001*
	Locomotion	2.34+1.49	10.00+3.00	0.0001*
24-35 months	Stationary	4.32+3.41	10.00+3.00	0.0001*
	Locomotion	4.19+3.45	10.00+3.00	0.0001*
	object manipulation	4.32+2.37	10.00+3.00	0.0001*
36-47 months	Stationary	4.09+2.86	10.00+3.00	0.0001*
	Locomotion	2.41+1.18	10.00+3.00	0.0001*
	Object manipulation	3.05+2.20	10.00+3.00	0.0001*
48-59 months	Stationary	7.00+0.00	10.00+2.00	0.0001*
	Locomotion	4.00+0.00	10.00+3.00	0.0001*
	Object manipulation	8.00+0.00	10.00+3.00	0.0001*

Table:4 Comparison of GMQ of study subject with manual scores by standard scores.

CHRO age groups	GMQ STUDY SCORES	Standard scores(as per manual)	P-value
	Mean and SD	Mean and SD	
12-23 months	59.20+8.89	100+15	0.0001*
24-35 months	64.32+17.54	100+15	0.0001*
36-47 months	56.68+12.26	100+15	0.0001*
48-59 months	76.00+0.00	100+15	0.0001*
Total	60.00+13.33	100+15	0.0001*

Discussion

The objective of our study was to quantify the gross motor developmental delay & categorize them on PDMS-2 in children who were referred with gross motor developmental delay. Table 1 depicts the distribution of our sample (total no. 96 – male 81, female 15). They were divided in to four groups as 12-23months, 24-35months, 36-47months,48- 59months Male were 84.4 % and females were 15.6%. Since our objective of study was gross motor quantification on PDMS-2, As the 42.7% of sample were in 12- 23 month & total 75% of population falling in to the 3 year of age group, that can be attributed towards awareness about early references for intervention. Early intervention is preventive and remedial in nature. It is important for children, it also maximizes the potential of these children for future independent living skills. Early

intervention is defined as a comprehensive coordinated community based system for developmentally vulnerable or delayed young children from birth to age 3year.¹² The chronological age and diagnosis, (total 96) they were referred from medical faculty. The diagnoses made were 1) Motor developmental delay (71) - 73.96%, 2) Developmental delay with visual problem (16)- 16.67%, 3) Cerebral palsy (6) - 6.25%,4) Genetic disorder (3) - 3.13%. which correlates the Prevalence of motor developmental delay (16-18%), cerebral palsy (3.3/1000),genetic disorder (2.5%)^{13,14}.Table 2 depicts the comparison of chronological age and age equivalence by using One- way ANOVA (Analysis of variance). Chronological age was calculated by taking Date of birth & Date of evaluation. Age equivalence for tests is usually labeled according to the content of test. Thus, age equivalence for the PDMS-2 are called motor ages. These motor ages are in manual as per the normal development, when compared Age equivalence was statically significant when compared with normative as per manual which state that children were developmentally delayed in motor age, significantly lower (where P=0.0001)In all groups which state that PDMS-2 is applicable to diagnose motor developmental delay. Table 3 and 4 depicts the comparison of standard score in each chronological age group with standard score of manual. In each age group and all the categories the standard score of study were statically significant (P= 0.0001). Comparison of GMQ with manual score also showed statically significant (P=0.0001) in all the age group and variables. The standard score & GMQ were lesser than the normative level. A study done on 124 children which diagnosis of Cerebral palsy, Down syndrome, hydrocephalus, preterm with developmental delay, full term with developmental delay, and others who motor developmental delay, concludes that PDMS-2 can be used as evaluator tool for above conditions.⁷ In the study on Reliability, Sensitivity to change, and Responsiveness of PDMS-2 in children with CP, shows that PDMS-2 can be used for children with developmental delay ¹⁵ PDMS-2 score of gross motor were applicable to quantify the gross motor developmental delay.

Limitation of study and Further scope of study:Sub group comparison was not done. Progressive component was not known. Child can be evaluated for motor developmental delay on interval basis

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